

Karst Reminders: Recognizing Features, Preventing Problems

Joe Baeten

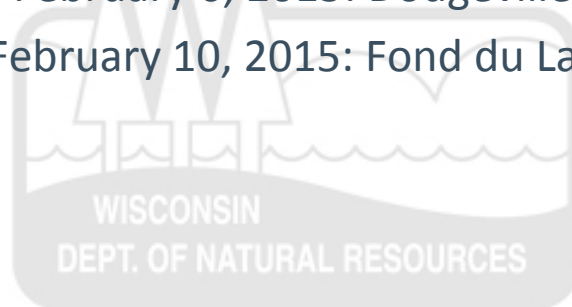
WDNR, Nutrient Management Program Coordinator

February 3, 2015: Green Bay

February 4, 2015: New London

February 6, 2015: Dodgeville

February 10, 2015: Fond du Lac

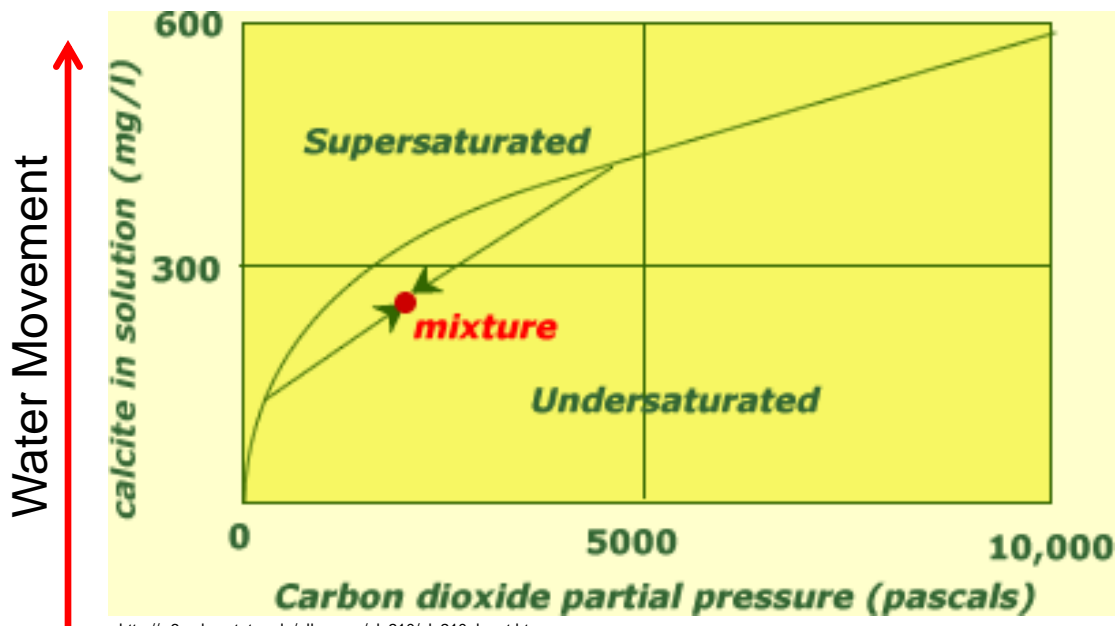


Outline

- What is Karst?
- Karst in Wisconsin
- Types of Karst Features
- Karst Identification
- CAFO Regulatory Requirements

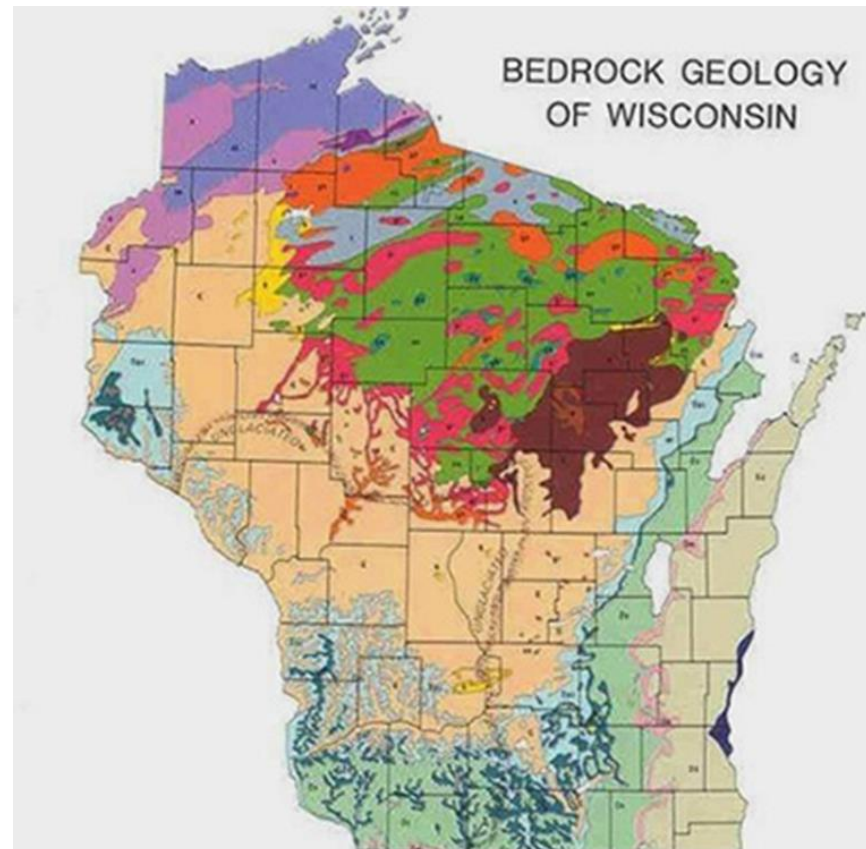
What is Karst?

- Karst is a type of landscape where water dissolves the underlying bedrock.
 - Rainwater & Groundwater Mixing



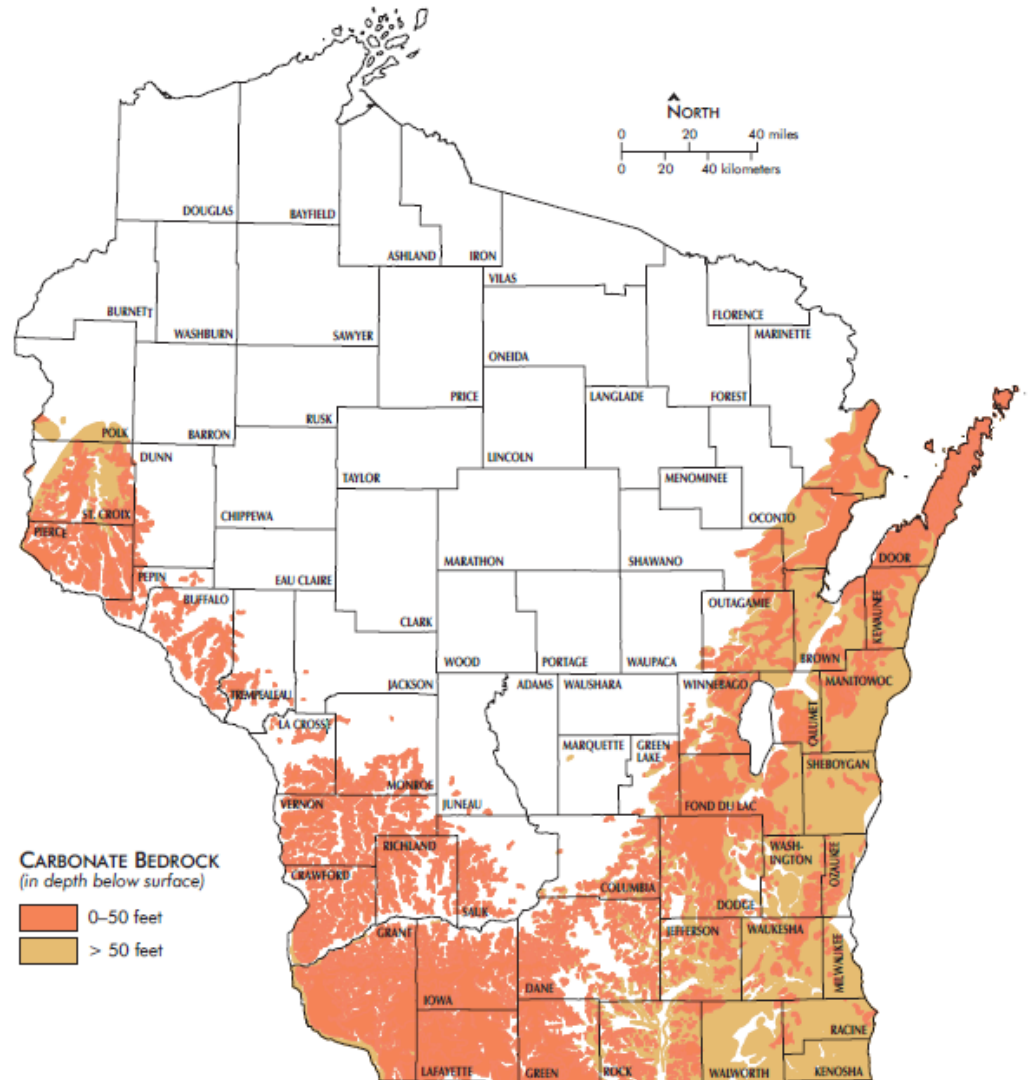
What is Karst?

- Karst is a type of landscape where water dissolves the underlying bedrock.
 - Soluble bedrock
 - Dolomite
 - $\text{CaMg}(\text{CO}_3)_2$
 - Limestone
 - CaCO_3



Karst in Wisconsin

- Karst potential in Wisconsin.



Karst Features - Sinkholes

De Pere, WI



Blue Mounds, WI



Eagle, WI



Sinkhole formation



Illustration courtesy the Pennsylvania Department of Environmental Protection.

Karst Features - Sinkholes

Brown County



Brown County



Karst Features - Sinkholes

Characterization of the shallow groundwater system in an Area with thin soils and sinkholes (Door Co., WI)

Wiersma, J. H., Stieglitz, R. D., Cecil, D. L., & Metzler, G. M.

- Two sinkholes that received surface drainage suspected to be important recharge of nearby spring complex.
- Lithium salt solutions (as tracer) introduced sinkholes
- Little longitudinal mixing
 - indicates open conduit flow.

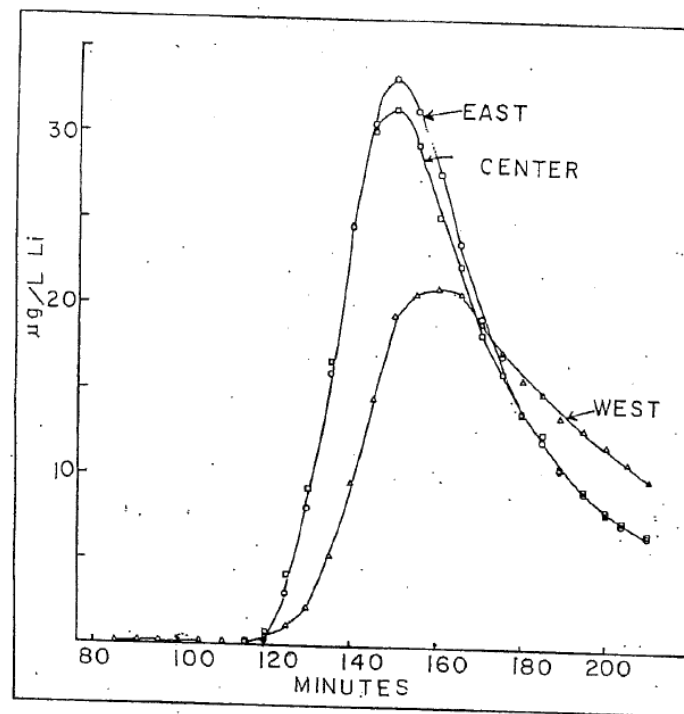


Figure 2: Lithium levels in three different sampling points in the spring complex.

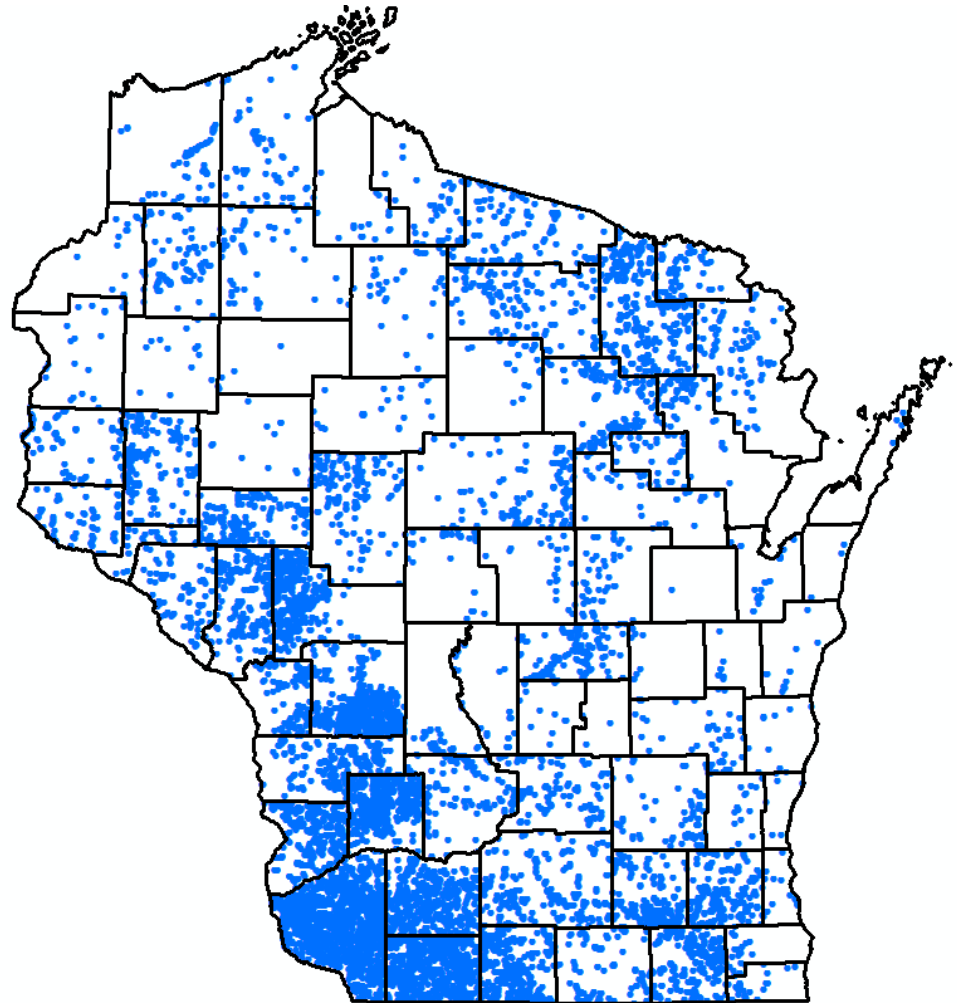
Karst Features - Fractures



Karst Features - Swallets

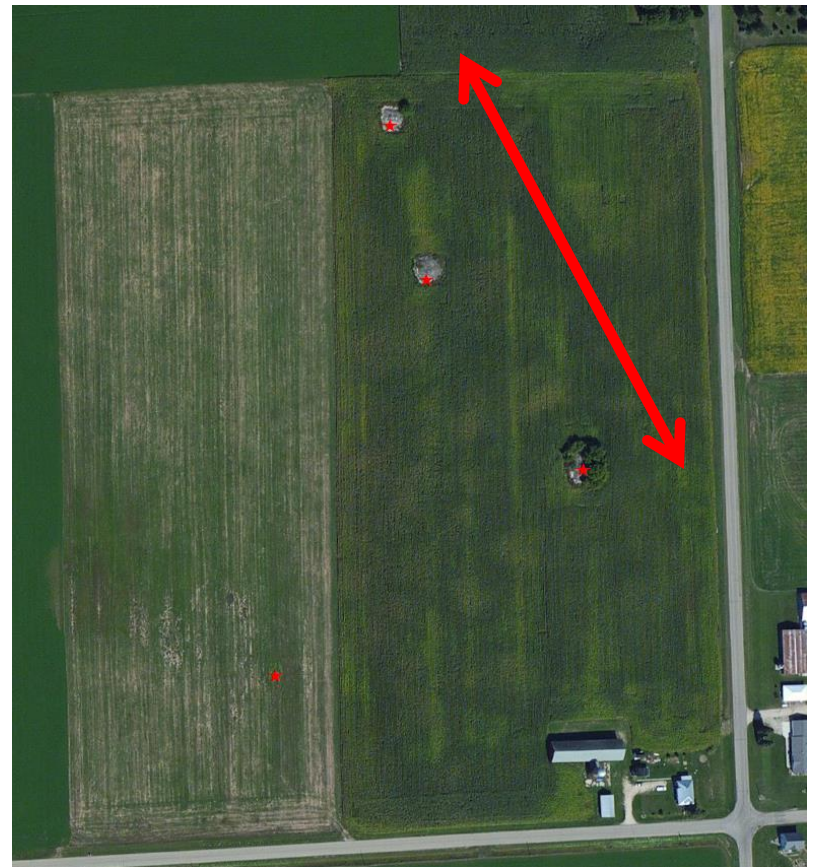
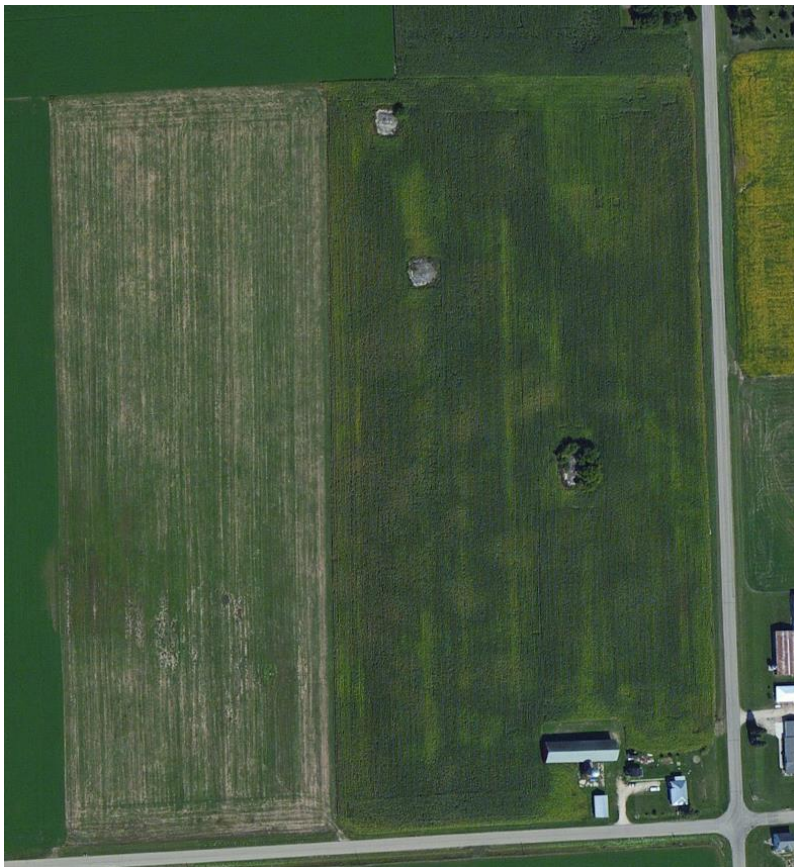


Karst Features - Springs



Karst Identification

- Aerial Imagery



Karst Identification

- Field Verify – Surface Water Flow Patterns



Karst Identification

- Field Verify – Evidence of Shallow Soils



Setback Requirements

- No application on soils with a depth to groundwater or bedrock if less than 24 inches – NR 243.14(2)(b)7.
 - Springs = groundwater at ground's surface.
- No application within 100' of a *direct conduit to groundwater* – NR 243.14(2)(b)8.
 - ▶ Wells
 - ▶ swallets
 - ▶ non-metallic mines
 - ▶ depressional groundwater recharge areas over shallow fractured bedrock
 - ▶ sinkholes
 - ▶ fractured bedrock at the surface
 - ▶ tile inlets discharging to groundwater
- No application 200' upslope conduits to groundwater unless effectively incorporated – NRCS technical standard 590.
- 300' Surface Water Quality Management Area (SWQMA) around sinkholes – NR 243.03(66)(d).

Wisconsin CAFO Nutrient Management Application Restrictions



Map Generated On: 1/8/2015

County: Kewaunee



Legend*

- Intermittent Streams
- Perennial Streams
- Waterbodies
- CAFO SWQMA 300 Feet
- CAFO SWQMA 1,000 Feet
- CAFO Fall Restriction (R)
- Fall N Restriction (P)
- CAFO Fall Restriction (W)
- No Winter App. Slope > 12%
- Winter Restriction if Slope > 9%
- Wetland Inventory
- Township-Range

*Markup is not included in the Legend

Sources:

Soil Map Units, Fall Restrictions, Winter Restrictions - Based on USDA NRCS SSURGO (updated 7/1/2012)
Surface Water - WI DNR 24K Hydro (acquired 1/9/2012)
SWQMAs - buffers around WI DNR 24K Hydro (based on 1/9/2012 Hydro)
2010 NAIP Imagery - USDA FS
Transportation - WI DOT (acquired 5/22/2012)

Notes

Red: No application.

Orange: No application upslope unless effectively incorporated.

Blue: SWQMA.



0 0.0 Miles

Scale 1: 2,630

This map has been developed utilizing the nutrient application restrictions from the September 2005 Wisconsin NRCS 590 Nutrient Management Practice Standard. This map is an initial inventory of nutrient spreading risks which must be field verified to identify other risk areas such as concentrated flow channels, wetlands, and conduits to groundwater. See the "Considerations" section of the 590 practice standard for additional planning suggestions. <http://efotg.nrcs.usda.gov/references/public/WI/590.pdf>

Questions

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